tech briefs

Westinghouse Savannah River Company

Hybrid Microwave Energy

at a glance

- Reduces waste volume
- Immobilizes hazardous constituents
- Completely destroys components
- Reclaims valuable metals
- Treats off-gas effluents
- U.S. Patents 6,262,405, 5,968,400, 5,891,011, 5,843,287

for more information

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Minimizes waste, recovers valuable metals

A team of scientists from the Westinghouse Savannah River Company (WSRC) and the University of Florida has successfully applied microwave technology to a variety of waste management applications. As a result of this collaboration, unique equipment and processes have been developed using hybrid microwave energy for the destruction of electronic circuitry and an assortment of waste streams, immobilization of hazardous constituents, and reclamation of valuable metals.

Background

Each year, many products containing electronic circuitry are discarded. Millions of electronic components and circuit boards must be disposed of in a cost-effective and environmentally safe manner. Presently, many of the products containing electronic components are discarded in landfills. Due to the large volume of these surplus materials many landfills are reaching capacity.

Over time, a wide range of hazardous materials contained within electronic components can leach from the waste in landfills and migrate into the ground water resulting in undesirable environmental consequences.

Provides versatility in waste management

The hybrid microwave system provides a simple processing method for the reduction of waste volume, immobilization of hazardous materials, and the ability to separate and reclaim important valuable metals. The system is compact, portable, and can be operated remotely.

Proven results

Electronic circuits and components from a variety of consumer products as well as from the DOE and DOD complex were successfully processed using this new technology.

Results of laboratory scale testing include the following:

- A wide array of electronic components were successfully treated in a relatively simple microwave process
- Significant volume reductions were attained
- Residues were vitrified into chemically durable matrices that met important environmental leaching standards
- Metal components were readily separated and precious metals were effectively reclaimed for reuse
- An additional function of the system was the successful treatment of secondary gaseous wastes resulting from the process

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Hybrid Microwave Energy

The technology also has been applied to other potentially hazardous materials including radioactive types of waste, weapons components, infectious medical wastes, tires and rubber components.

Combined system also treats off gases

Combining the Hybrid Microwave Energy System with the patented Microwave Off-Gas Treatment System provides a tandem process that treats not only primary wastes (both solids and liquids) but also secondary wastes such as gaseous effluents. In laboratory scale testing, secondary gaseous wastes resulting from the primarily waste treatment process were successfully reduced to acceptable or nondetectable levels.

Partnering opportunity

U.S. Patents 6,262,405, 5,968,400, 5,891,011, and 5,843,287 have been issued on this system.

WSRC invites interested companies with proven capabilities in this area of expertise to develop commercial applications for this process under a cooperative research and development agreement or a licensing agreement. Interested companies will be requested to submit a business plan setting forth company qualifications, strategies, activities, and milestones for commercializing this invention. Qualifications should include past experience in the commercial uses of similar processes, reasonable schedule for commercial process launch, an established customer base, and evidence of sufficient financial resources for process development and launch.

Technology transfer

WSRC is the managing contractor of the Savannah River Site for the U.S. Department of Energy. WSRC scientists and researchers develop technologies designed to improve environmental quality, support international nonproliferation, dispose of legacy wastes, and provide clean energy sources.

WSRC is responsible for transferring technologies to the private sector so that these technologies may have the collateral benefit of enhancing U.S. economic competitiveness.

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